

Amendments to the Claims

This listing of claims replaces all prior versions, and listings, of claims in the application.

Listing of Claims

~~Claim 1.~~ (Currently amended): A blood treatment device ~~having~~ comprising a blood purification element ~~(1)~~, divided into two chambers by a semipermeable membrane ~~(2)~~, whose first chamber ~~(3)~~ is part of a dialysis fluid loop and whose second chamber ~~(4)~~ is part of an extracorporeal blood loop, ~~having~~ a dialysis fluid supply line for supplying fresh dialysis fluid to the first chamber ~~(3)~~ and/or into the blood loop, ~~having~~ a dialysis fluid removal line for removing used dialysis fluid from the first chamber ~~(3)~~, ~~having~~ a control unit ~~(34)~~ for controlling the blood treatment device, ~~having an analysis unit (33),~~ ~~having at least one sensor (27, 28), connected to the analysis unit (33),~~ on at least one of the blood loop or dialysis fluid loop to detect ~~the~~ and measure a concentration of a first material ~~which may penetrate~~ capable of penetrating the semipermeable membrane ~~(2), and~~ the an analysis unit ~~(33) being capable of determining the~~ operatively connected to the at least one sensor to determine i) a

blood purification performance L1 of the blood purification element for the first material ~~on the basis of~~ based on the measurement values of the at least one sensor ~~(27, 28),~~
~~characterized in that~~
~~the analysis unit (33) is also capable of determining the~~ and ii) a blood purification performance L2 of the blood purification element for a second material, which is different from the blood purification performance L1 for the first material, ~~on the basis of~~ based on the blood purification performance L1 for the first material.

Claim 2. (Currently amended): The blood treatment device according to Claim 1, ~~characterized in that~~ wherein the blood purification performance L is the effective dialysis $Deff$.

Claim 3. (Currently amended): The blood treatment device according to Claim 2, ~~characterized in that~~ wherein the analysis unit ~~(33) is capable of deriving~~ derives an effective mass exchange coefficient k_{0A1eff} from ~~the~~ a measured dialysance D_{leff} for the first material, ~~of determining the~~ determines an effective mass exchange coefficient k_{0A2eff} for the second material from ~~the~~ a stored ratio f between ~~the~~ a theoretical mass exchange coefficient k_{0A2th} of the second material and ~~the~~ a theoretical mass exchange coefficient k_{0A1th} of the first material by multiplying with k_{0A1eff} , and ~~of~~

~~deriving the~~ derives an effective dialysance D_{2eff} for the second material from k_{0A2eff} .

~~Claim 4.~~ (Currently amended): The blood treatment device according to Claim 2, ~~characterized in that~~ wherein the analysis unit ~~(33)~~ is ~~capable of deriving~~ derives from ~~the~~ a stored theoretical mass exchange ~~coefficients~~ coefficient k_{0A1th} for the first material and ~~k_{0A1th}~~ a stored theoretical mass exchange coefficient k_{0A2th} for the second material, values corresponding thereto for the theoretical dialysances D_{1th} and D_{2th} , and ~~of determining~~ determines the an effective dialysance D_{2eff} for the second material from ~~the~~ a measured dialysance D_{1eff} for the first material multiplied by ~~the~~ a ratio D_{2th} to D_{1th} .

~~Claim 5.~~ (Currently amended): The blood treatment device according to Claim 1, ~~characterized in that~~ wherein the at least one sensor is a first ~~upstream~~ downstream sensor ~~(28)~~ on the dialysis fluid removal line ~~(8a)~~ for measuring the concentration of the first material in the used dialysis fluid.

~~Claim 6.~~ (Currently amended): The blood treatment device according to Claim 5, ~~characterized in that it also includes~~ further comprising a dialysis fluid preparation unit ~~(11)~~, ~~which is~~ connected to the control unit ~~(34)~~.

~~Claim 7.~~ (Currently amended): The blood treatment device according to Claim 6, ~~characterized in that~~ the analysis unit ~~(33)~~ and the control unit ~~(34)~~ are being capable of determining the blood purification performance L1 for the first material ~~through the following by a method comprising~~[[:]]
~~storage of the~~ storing a concentration Cldi1 of the first material in the fresh dialysis fluid in the analysis unit ~~(33)~~,
~~measurement of the~~ measuring a concentration Cldo1 of the first material in the used dialysis fluid using the first downstream sensor ~~(28)~~ and ~~storage of~~ storing Cldo1 in the analysis unit ~~(33)~~,
~~alteration of the~~ altering a concentration Cldi of the first material in the fresh dialysis fluid by the dialysis fluid preparation unit ~~(11)~~ at the command of the control unit ~~(34)~~,
~~storage of the~~ storing a changed concentration Cldi2 of the first material in the fresh dialysis fluid in the analysis unit ~~(33)~~,
~~measurement of the~~ measuring a changed concentration Cldo2 of the first material in the used dialysis fluid using the first downstream sensor ~~(28)~~ and ~~storage of~~ storing Cldo2 in the analysis unit ~~(33)~~, and
~~determination~~ determining by the analysis unit ~~(33)~~ of the blood purification performance L1 on the basis of the concentrations Cldi1, Cldo1 and changed concentrations Cldi2, Cldo2 of the first material in the fresh and used dialysis fluid.

~~Claim 8.~~ (Currently amended): The blood treatment device according to Claim 7, ~~characterized in that~~ wherein the dialysis fluid preparation unit ~~(11)~~ performs the change of the concentration Cldi in the form of a step or bolus.

~~Claim 9.~~ (Currently amended): The blood treatment device according to Claim 7, ~~characterized in that it also includes~~ further comprising a first upstream sensor ~~(27)~~, connected to the analysis unit ~~(33)~~ and ~~placed~~ located on the dialysis fluid supply line ~~(7b)~~, for measuring the concentrations Cldi1 and Cldi2 in the fresh dialysis fluid.

~~Claim 10.~~ (Currently amended): The blood treatment device according to Claim 1, ~~characterized in that it also includes~~ further comprising a second downstream sensor ~~(48)~~, connected to the analysis unit ~~(33)~~ and ~~placed~~ located on the dialysis fluid removal line ~~(8a)~~, for measuring the concentration C2do of the second material in the used dialysis fluid.

~~Claim 11.~~ (Currently amended): The blood treatment device according to Claim 10, ~~characterized in that~~ wherein the analysis unit ~~(33)~~ ~~is capable of determining the~~ determines a concentration C2bi of the second material in the blood flowing to the second chamber ~~(4)~~

~~on the basis of~~ based on the measured concentration C2do of the second material in the used dialysis fluid and the stored concentration C2di of the second material in the fresh dialysis fluid and the established blood purification performance L2 of the second material.

~~Claim 12.~~ (Currently amended): The blood treatment device according to Claim 1, ~~characterized in that~~ wherein the first material is sodium.

~~Claim 13.~~ (Currently amended): The blood treatment device according to Claim 1, ~~characterized in that~~ wherein the second material is potassium, glucose, creatinine, calcium, or phosphate.

14. (New) A hemodialysis device comprising:

a blood purification element having a semipermeable membrane, a first chamber connected to a dialysis fluid loop, and a second chamber connected to an extracorporeal blood loop;

a dialysis fluid supply line to supply fresh dialysis fluid to the first chamber and/or into the blood loop;

a dialysis fluid removal line to remove used dialysis fluid from the first chamber;

a control unit to control the hemodialysis device;

a sensor on the dialysis fluid removal line to measure a concentration of a first material in the used dialysis fluid; and

an analysis unit operatively connected to the sensor to determine i) a blood purification performance $L1$ of the blood purification element for the first material based on the measured concentration, and ii) a blood purification performance $L2$ of the blood purification element for a second material based on the performance $L1$ for the first material, the performance $L2$ being different from the performance $L1$,

the analysis unit deriving from a stored theoretical mass exchange coefficient k_{0A1th} for the first material and a stored theoretical mass exchange coefficient k_{0A2th} for the second material, values corresponding thereto for theoretical dialysances D_{1th} and D_{2th} , and determining an effective dialysance D_{2eff} for the second material from a measured dialysance D_{1eff} for the first material multiplied by a ratio D_{2th} to D_{1th} .

15. (New) A hemodialysis device comprising:

a blood purification element having a semipermeable membrane, a first chamber connected to a dialysis fluid loop, and a second chamber connected to an extracorporeal blood loop;

a dialysis fluid supply line to supply fresh dialysis fluid to the first chamber and/or into the blood loop;

a dialysis fluid removal line to remove used dialysis fluid from the first chamber;

a control unit to control the hemodialysis device;

a sensor on the dialysis fluid removal line to measure a concentration of a first material in the used dialysis fluid; and

an analysis unit operatively connected to the sensor to determine i) a blood purification performance $L1$ of the blood purification element for the first material based on the measured concentration, and ii) a blood purification performance $L2$ of the blood purification element for a second material based on the performance $L1$ for the first material, the performance $L2$ being different from the performance $L1$,

the analysis unit deriving an effective mass exchange coefficient k_{0A1eff} from a measured dialysance $D1eff$ for the first material, determining an effective mass exchange coefficient k_{0A2eff} for the second material from a stored ratio f between a theoretical mass exchange coefficient k_{0A2th} of the second material and a theoretical mass exchange coefficient k_{0A1th} of the first material by multiplying with k_{0A1eff} , and deriving an effective dialysance $D2eff$ for the second material from k_{0A2eff} .

16. (New) The hemodialysis device according to claim 15, wherein the sensor detects an electrical conductivity of the first material in the used dialysis fluid.

17. (New) The hemodialysis device according to claim 15, further comprising a second sensor on the dialysis fluid removal line to measure a concentration of the second material in the used dialysis fluid.